HANDOUT 9-2

Case Study Number 9-2 Solution

Estimating PM_{10} and $PM_{2.5}$ Emissions from Agricultural Field Burning

Question 1: What is the basis of the activity data for agricultural burning?
Answer: The activity data that is used to estimate emissions from agricultural burning is the number of acres of the crop burned.

Question 2: What does the loading factor represent?
Answer: The loading factor represents the tons of biomass of vegetation per acre burned, and is used to convert the acres of biomass burned into a mass loading value. The mass loading is needed because the emission factor is in terms of pounds of PM per ton of biomass burned.

Question 3: What is the methodology for estimating PM_{10} emissions from agricultural burning operations?
Answer: The following equation (Equation 9-5 in the Student Manual) shows the formula for calculating PM emissions from agricultural burning.

$$E = A * LF * EF$$

Where: E = Emissions (lbs pollutant/month)
A = Number of acres burned per month
LF = Loading factor (tons/acre)
EF = Emission factor (lbs pollutant/ton)

Question 4: What is your estimate of the PM_{10} emissions from wheat stubble burning in the county for the month of June?
Answer:

Emissions = 1,950 acres x 1 tons/acre x 8.82 lbs PM_{10}/ton = 17,199 lbs PM_{10}

17,199 lbs PM_{10} x 1 ton/2000 lbs = 8.6 tons PM_{10}

Question 5: How would $PM_{2.5}$ emissions be estimated if this case study required that an estimate of $PM_{2.5}$ be developed?
Answer: The same equation that was used for PM_{10} is used for $PM_{2.5}$, with the exception that the $PM_{2.5}$ emission factor is plugged into the equation.

Emissions = 1,950 acres x 1 tons/acre x 8.34 lbs $PM_{2.5}$/ton = 16,263 lbs $PM_{2.5}$

16,262 lbs $PM_{2.5}$ x 1 ton/2000 lbs = 8.1 tons $PM_{2.5}$

Question 6: How would annual PM_{10} emissions from agricultural burning be calculated?
Answer: The formula in Equation 9-5 of the Student Manual is used to calculate emissions for each month during the burning season. These monthly totals are then summed to give an annual emissions estimate.